Egyptian Fractions II

Ancient Egyptians used unit fractions, such as $\frac{1}{2}$ and $\frac{1}{3}$ to represent other fractions. For example, they might express the number $\frac{3}{4}$ as $\frac{1}{2}+\frac{1}{4}$ or $\frac{1}{3}+\frac{1}{4}+\frac{1}{6}$. The Egyptians did not use a given unit fraction more than once, so they would **NOT** have written $\frac{3}{4}=\frac{1}{4}+\frac{1}{4}+\frac{1}{4}$.

1. Use the information above to answer the following questions.
   a. How might the Egyptians have expressed the number $\frac{2}{7}$?

   b. How might the Egyptians have expressed the number $\frac{4}{5}$?

   c. What patterns or strategies help you find equivalent expressions using unit fractions?

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Source: Adapted from Illustrative Mathematics.

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2. We will see how we can use identities between rational expressions to help in our understanding of Egyptian fractions.
   a. Verify the following identity for any x > 0:

$$\frac{1}{x} = \frac{1}{x+1} + \frac{1}{x(x+1)}$$

   b. How can you use the identity above to find Egyptian fractions for 1a and 1b? Are the Egyptian fractions you found using the identity the same as your original solutions to 1a and 1b?

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